PROCESS FOR THE CARBONYLATION OF PENTENENITRILE

Abstract of the Disclosure

Processes to prepare 5-cyanovaleric acid or its ester is provided, by carbonylation of a pentenenitrile, wherein pentenenitrile is reacted with carbon monoxide and water and/or an alcohol in the presence of a catalyst system. The catalyst system contains:

(a) a metal of Group VIII or a compound thereof and

(b) a bidentate phosphine, arsine and/or stibine ligand, wherein the bidentate ligand has the general formula (I):

$$R^1R^2\text{-}M^1\text{-}R\text{-}M^2\text{-}R^3R^4 \qquad (I)$$

wherein M^1 and M^2 are independently P, As or Sb, R is a divalent organic bridging group, which bridging group comprises a chain of 3 to 5 atoms directly connecting the 2 phosphorus atoms, which chain consists of carbon atoms and optionally a nitrogen, oxygen or sulphur atom or a silano or dialkylsilicon group, which alkyl groups independently comprise from 1 to 4 carbon atoms, and R^1-R^4 represent the same or different optionally substituted tertiary alkyl groups,

(c) an acid having a pKa less than 3, as measured at 18 °C in an aqueous solution.

ε-caprolactam is also prepared by reduction of 5-cyanovaleric acid or ester obtained above to 6-

aminocaproic acid or ester, and then cyclisation of the 6-aminocaproic acid or ester to ε-caprolactam.